B1 contd

as an anode. Each image pixel contains carbon nanotube (hereinafter called CNT) layer thereon as electron emission sources. The CNT layer made of a slurry consists of organic bonding agent, silver powder, and CNT, which having 5-100nm in diameter and 1000-3000nm in length. The principle of field emission is in terms of electric field accelerating cold electron which is emitted from the tip of CNT through vacuum space and bombards anode which is an indium tin oxide (ITO) substrate having phosphor pixel to generate fluorescence. By contrast to conventional cathode ray tube which is in terms of thermionically emitted electrons emerge from a tungsten wire, the field emission modeling has quite different fashion.--

Please replace the paragraph beginning at page 2, line 1, with the following rewritten paragraph:

B2

--A typical field display schematic cross-sectional view is shown in Fig. 1. The figure shows a conductive line array 20 coated on a substrate 10 by screen-printing a conductive slurry containing silver through a line-patterned screen. Thereafter, a CNT layer is attached thereon by screen-printing a CNT paste through a mesh patterned screen to form image pixel layer 30. The CNT paste consists of organic bonding agent, resin, carbon nano-tubes, and silver powder. After that the substrate is soft baked in an oven using a temperature of about 50–200 °C to remove volatile organic solvent. Finally a higher temperature sintering process is carried out to cure the CNT on and to electric

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B2 ✓ coupled with the conductive silver lines. In the sintering process, all of

cont'd the organic bonding agent and resin are burned out.--

Please replace the paragraph beginning at page 2, line 24, with the following rewritten paragraph:

B3 ✓ --Since the electric property (current density vs. intensity of electric field) is predetermined by a number of exposed CNT, which should be electric coupled with the conductive layer 20 of the cathode. However aforementioned CNT field emission device of prior art in general emits very low current density unless using extra processes and/or using high electric field intensity. Please refer to Fig. 2, showing a curve 110 by using conventional process and another curve 120 in accordance with the present invention. In figure, the current density versus electric field is shown. The conventional process has a current density lower than 1 mA/cm^2 for intensity of electric filed of about $6V/\mu m$. To achieve 10-100 mA/cm^2 in current density emission exerting rather high electric field intensity is usually expected.--

Please replace paragraph beginning on page 3, line 11, with the following rewritten paragraph:

B4 ✓ --Thus, as acquired knowledge known by the inventor, none of issued invention discloses a CNT emission display, which can approach the goal of producing the critical current density in the electric field intensity as low as $6V/\mu m$. U.S. Patent Number 5, 616,368, issued to Jim, et al., disclose a patent about field emission display. Jim, et al.

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proposed that using activated ultra-fine diamond particulate as emission sources for field emission source can significantly improving the prior art of their patent. As stated in Jim's patent, ultra-fine diamond particulate has a low or negative electrical affinity, and thus can act as field emitter in low electric field. An electric field of more than 70V/μm is needed for typical p-type doped diamond substrate to generate an emission current density of 10 mA/cm^2. In Jim's patent, a field of a bout 12V/μm or even down to 5V/μm is required to achieve the critical current density.--

B4 ✓ cont'd

Please replace the following paragraph beginning on page 3, line 24, with the following rewritten paragraph:

--The method of Jim, et al comprises the following steps. First, diamonds, predominantly having maximum dimensions in the range of 5-10,000 nm are prepared. Prior to paste the particulate emitters to the substrate, the ultra-fine particles are exposed in a plasma containing hydrogen at a temperature in excess of 300 °C. In order to minimize agglomerations of the particles during the plasma activating processing and in order to have relative uniform activation on major part of the exposed diamond surface, the particles in continuous motion by injecting high speed gas flow is performed. In addition, the diamond particles have less than 10 volume percent of graphitic or amorphous carbon phases. Thereafter the diamonds particles with bond agent are mixed and screen-print to a predetermined conductive trace containing

B5 ✓

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B5 cont'd

substrate. Finally, a sintering process at a temperature of about 500 °C is performed to form pixels.

Please replace the following paragraph beginning on page 4, line 12, with the following rewritten paragraph:

B6

--As forgoing prior art, for CNT there is not available method present to improve the problem of the high electric filed needed unless using the ultra-fine diamond particles. In addition, the method to alleviate agglomeration of the particles proposed by the prior art is done before pasting on the conductive layer. Consequently, whether agglomerated again after slurry prepared and sintering process is not sure. Thus the present invention is to improve the CNT field emitter. Furthermore, CNT field emitter improvement by the present invention has lower cost and easily to implement.--

Please replace the following paragraph beginning on page 5, line 1, with the following rewritten paragraph:

B7

--The present invention discloses a method of CNT emitter current density improvement by a taping process. The method comprises following steps. First of all, a conductive pattern coated on a substrate by screen-printing a conductive slurry containing silver through a patterned screen is carried out. Thereafter, a CNT layer is attached thereon by screen-printing a CNT paste through a mesh pattern screen to form CNT image pixel array layer. The CNT paste consists of organic bonding agent, resin, silver powder, and carbon nano-tubes. After that

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the substrate is soft baked by an oven using a temperature of about 50-200 °C to remove volatile organic solvent. A higher temperature sintering process, for example 350-550 °C is then carried out to solidify the CNT on and electric coupled with conductive pattern. Finally, an adhesive film is closely attached on the cathode substrate and is then removed the adhesive film away so as to remove those badly bonding CNT portion and to vertically pull up a portion of CNT which originally laid down on the surface after sintering. Consequently, the current density, brightness, and uniformity of the emitter sources are significantly improved.--

B7 cont'd

Please replace the following paragraph beginning on page 7, line 5, with the following rewritten paragraph:

--Hence, the inventors propose following processes.

In a preferred embodiment, the CNT layer formed is carried out as aforementioned background of the invention. After screen print, the conductive line array of about 50-150μm in interval and 150-300μm each in width is formed. Each of the field pixel is about 0.02-0.09 mm^2 are formed. The soft baked temperature is about 50-200 °C to remove away organic volatile solvent. A taping process is performed by using adhesive film such as tape with adhesive material thereon or polymer film with static electrical attractive material on the CNT substrate through a laminator to closely attach on the CNT layer and the adhesive film or the polymer film are pulled up and removed away. The process

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B8 cont'd

can remove some badly attached CNT. Some of the CNT buried in the CNT layer is also pull up to a proper direction.--

Please replace the following paragraph beginning on page 8, line 1, with the following rewritten paragraph:

B9

--Fig. 2 shows a comparison of curves 110 and 120 of current density vs. electric field intensity for a CNT field emitter formed by a conventional method without taping process and formed by the present invention (the conventional method but associate with taping process, respectively). With taping process, the current density is found to be higher than 10 mA/cm^2 for electric field intensity of about 5V/μm. However, without taping process, the current density is still lower than 1 mA/cm^2 even for electric field intensity of about 6V/μm. The result shows the present invention has protruding effect.--

Please replace the following paragraph beginning on page 8, line 10 with the following rewritten replacement paragraph:

B10

--Fig. 3 shows a cross-sectional view of CNT emitter pixel without taping process to the CNT cathode, inspecting by scanning using electron microscope. Fig. 4 shows a cross-sectional view image with a taping process to the CNT cathode. By comparing Fig. 3 with Fig. 4, the CNT layer for taping CNT emitter pixel is thinner than that of without taping. It proves that a portion of the CNT layer with badly attached on cathode is removed through the taping process. In addition, some of the buried CNT emitter sources can also be pulled up to a proper directionally.--

Please replace the following paragraph beginning on page 8, line 19, with the following rewritten replacement paragraph:

--The present invention provides the following benefits:

(1) The current density of CNT emitter source can be significantly increased at low electric field intensity without complicated process but by a simple taping process.--

B11

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